SYNCHRONIZATION DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application is a National Phase Patent Application of International Application Number PCT/DE2003/01115, filed on March 28, 2003, which claims priority of German Patent Application Number 102 16 218.2, filed on April 5, 2002.

BACKGROUND OF THE INVENTION

The invention relates to a synchronization device.

A synchronization device of this kind serves to prepare an optical synchronization signal for computer-controlled picture recordings of a motion picture camera. For this, the synchronization device has a signaling device for generating an optical synchronization signal whereby the optical synchronization signal can be initiated by means of a computer which controls the picture recordings.

In film productions computer-controlled camera moves are often carried out (motion control). In order to achieve a simpler synchronization of the individual takes of such computer-controlled motion control, a synchronization device is used termed a "bloop-light". This synchronization device comprises a light source which is triggered by the computer which controls the camera motion at a specific point in time after the start of the take. The light source of the synchronization device is positioned in the initiation time point in the recording picture of the motion picture camera. From the computer-controlled illumination of the light source it is readily possible to determine the synchronizing time point of the individual takes in the subsequent post-production process.

Synchronization devices of this kind therefore fulfil the function of a type of electronic shutter used for the synchronization of sound and picture recordings of a motion picture camera. As opposed to an electronic shutter, it is possible through the generic synchronization device to synchronize a number of computer-controlled picture recordings.

From the prior art, synchronization devices are known which normally contain a single light source for generating the optical synchronization signal. This has the drawback that with such synchronization devices only the generation of a single optical synchronization signal is possible.

SUMMARY OF THE INVENTION

According to the invention it is proposed that a signaling device of a synchronization device has a number of optical signaling elements for generating optical synchronization signals. By means of a signaling device having a number of optical signaling elements it is possible to obtain a corresponding number of different optical synchronization signals

according to the combination possibilities which are provided by the number of optical signaling elements.

With for example only two optical signaling elements already three different optical synchronization signals can be produced (e.g., both optical signaling elements active, only the first signaling element active, only the second signaling element active). A larger number of optical signaling elements enables a corresponding larger number of optical synchronization signals to be generated.

The phrase "optical signaling elements," as used herein means both structural elements for generating an optical signal which emit light and also structural elements which can be switched between states which during illumination of the synchronization device are perceived as different optical signals.

In an exemplary embodiment the signaling device of the synchronization device has optical signaling elements which are arranged in the form of a digital display for letters and/or numbers. Individual optical signaling elements thereby represent individual segments of the letters and/or numbers to be displayed. In this way a number of different optical synchronization signals can be generated in the form of letters and/or numbers or combinations thereof.

In another exemplary embodiment, the optical signaling elements of the signaling device are arranged in the form of a matrix. The number of optical synchronization signals which can be displayed is thereby solely defined by the resolution of the matrix, i.e. the number of optical signaling elements arranged in lines and columns. Thus symbols and designs can also be generated as optical synchronization signals in a matrix in addition to the conventional letters and/or numbers and combinations thereof. The arrangement of the optical signaling elements in a matrix thus enables an even more flexible generation of an even larger number of optical synchronization signals compared with the arrangement as a digital display.

The synchronization device in an exemplary embodiment has optical signaling elements which are formed as light-emitting light elements. A safe visible generation of the optical synchronization signal required is thereby guaranteed independently of the lighting conditions of the scene which is to be recorded.

The signaling device of the synchronization device is advantageously mounted in a housing whereby the optical signaling elements are visible on at least one surface of the housing. This housing can be small, robust and compact and thus suitable for use at the various film locations.

It is expedient if the housing comprises control electronics for the signaling device and a control interface for connection to a computer. Either the energy supply of the synchronization device is provided likewise through the control interface or an inherent energy supply through batteries and/or accumulators is provided in the housing. In an exemplary embodiment the control interface can be connected to a CAN Bus system.

It is particularly advantageous if the optical signaling elements of the synchronization device comprise light-emitting diodes (LED). LEDs are particularly suitable, when compared with conventional light means with incandescent coils, owing to their high degree of efficiency (low energy consumption), their insensitivity to shudders and their long service life. Furthermore they reach the desired light intensity within few micro seconds and die out equally quickly when switched off which is particularly important in the case of high speed recordings.

The light-emitting diodes are preferably suitable for controllable additive color mixing of the light generated by the optical signaling element. The possibility thus arises of generating additional optical synchronization signals by means of the adjustable light color of the LEDs. Furthermore with such LEDs the intensity of the emitted light can be accurately matched to the sensitivity of the film material used.

In a further exemplary embodiment, the synchronization device has an interface for connection to a light device for projection of an optical synchronization signal. If a clip or detail to be recorded by the motion picture camera is to be so small that the synchronization device cannot be brought in sufficiently into the picture clip, then an additional lighting device can be connected to the synchronization device through a corresponding interface. This external lighting device should be designed so that an optical synchronization signal can be projected with it into the small picture clip. As a result of the high optical performance with small geometric dimensions, laser diodes are particularly suitable as a light source for an additional connectable lighting device.

In order to be able to generate with the laser diode a number of optical synchronization signals, the lighting device should be equipped with an additional projection lens. Such a projection lens should enable the laser diode beam to be manipulated into different geometric patterns. So-called holographic optical elements (HOE) or diffractive optical elements (DOE) are particularly suitable for this purpose. With these very small compact optical elements, e.g., lenses, it is possible to generate any geometric pattern which has significantly the same size and sharpness over a radiating range of many meters.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages of the invention will now be explained with reference to the embodiments given by way of example with reference to the accompanying drawings.

Figure 1a is a perspective view of an exemplary embodiment synchronization device of the present invention;

Figure 1b is a further perspective view of the synchronization device of Figure 1, and

Figure 2 is a perspective view of another exemplary embodiment synchronization device of the present invention.

DETAILED DESCRIPTION

Figure 1a shows a first exemplary embodiment of a synchronization device 1 having a square housing 10 in a side perspective view. On a side face of the housing is the control interface 11 for connection of the synchronization device 1 to the computer of a computer-controlled recording device (motion control) of a motion picture camera. This control interface 11 can be designed so that it can be connected to a CAN Bus system which is typical for motion-control systems.

On the same side face of the housing there is furthermore an internal thread 13 which enables the synchronization device 1 to be fixed onto an associated support element of the camera system.

On the surface of another side face are mounted as optical signaling elements 64 light elements 2 equidistant from each other in an 8x8 matrix. Each of the 64 light elements 2 comprises at least one light-emitting diode (LED). By means of a signaling device (not shown) mounted inside the housing 10 and comprising a control electronics (not shown) for the light elements 2 it is possible to control the 64 light elements 2. The light elements 2 in an exemplary embodiment, each have at least three LEDs designed for additive color mixing. In this way the color tone and intensity can be individually controlled for the emitted light of each light element 2.

The synchronization device 1 receives signals for controlling the light elements 2 through the control interface from the computer of the motion-control system. Thus by means of the 8x8 matrix which is formed by the light elements 2 a number of letters and/or numbers, symbols, patterns and combinations thereof can be displayed as optical synchronization signals. Furthermore these optical synchronization signals can be adjusted in color and intensity to the relevant conditions, i.e. lighting situation of the scene to be recorded, sensitivity of the film material.

When using the synchronization device 1 at a recording site, the computer of the motion control system causes the synchronization device 1 at the start of the first recording take to be seen in the scene and initiates the desired optical synchronization signal at a defined time point of the computer-assisted camera run. After this the synchronization device 1 is removed from the scene and the take is recorded up to the end. After the start of the second take the synchronization device 1 is again positioned in the scene and exactly at the

same time point after the start of the second take, the computer of the motion-control system again initiates the optical synchronization signal. The synchronization signal is removed from the scene and the second take is completed. The procedure is repeated according to the same plan for each further additional take. It is likewise possible to record the optical synchronization signal at the end of each take by means of the synchronization device 1.

Instead of the control interface 11 it would likewise be conceivable to design the synchronization device 1 with a cable-less radio or infrared interface. For this however a separate energy supply would be necessary through batteries or accumulators stored in the housing 10. With the embodiments of the synchronization device 1 illustrated in Figures 1a, 1b and 2 the energy supply is provided through separate poles at the control interface 11 provided for this purpose.

Figure 1b shows the first exemplary embodiment of the synchronization device 1 in a perspective view turned 90 degrees relative to Figure 1a. On the side face of the housing 10 opposite the control interface 11 the synchronization device 1 has an interface 12 for connecting an external lighting device for the projection of an optical synchronization signal into a scene which is to be recorded.

In the event that the peripheral conditions of the scene to be recorded do not permit the synchronization device 1 for generating the optical synchronization signal to be mounted in the scene an additional external lighting device can be connected to the synchronization device 1 through the interface 12. By means of this external lighting device an optical synchronization signal can be projected into the scene being recorded provided that the lighting device is suitably aligned. The triggering of this projected optical synchronization signal is in turn undertaken by the computer of the motion-control system through the control interface 11 and the interface 12.

Figure 2 shows a second embodiment of a synchronization device 1 according to the invention from the same perspective as Figure 1a. The same structural elements are thereby marked with the same reference numerals.

As opposed to the embodiment illustrated in Figures 1a and 1b the synchronization device 1 in Figure 2 has lighting elements 2 which are arranged in the form of a two-position digital display. All the numbers and/or single letters and combinations thereof can be generated by means of the illustrated digital display as optical synchronization signals.

By means of suitable lighting elements 2 and corresponding control electronics (not shown) it is possible to adjust the intensity and color tone of the light emitted from the lighting elements 2 even with this embodiment.

It is clear that the synchronization device according to the invention can have a large number of further optical signaling elements. The type of generation of the optical signal by means of the optical signaling elements can be achieved by various ways (e.g. plasma light source, liquid crystal display, luminescent light sources or purely mechanical display

elements). Essential to the invention is only that a number of optical synchronization signals can be generated through the combination of at least two optical signaling elements.

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